Alevin is the life-history stage of a salmonid immediately after hatching and before the yolk-sac is absorbed. Alevins usually remain buried in the gravel in or near a series of redds until the yolk-sac is absorbed, after which they swim up and enter the water column.

Alleles are different forms of a gene at a single gene locus. A single nuclear gene contains two alleles. For example, a single gene may contain one allele that codes for blue eyes and another allele for brown eyes, or the gene may contain two alleles that code for blue eyes. Differences arise by mutation and are inherited by offspring.

Allele Frequency is the frequency of an allele in a given population. Differences in allele frequencies between populations are used to measure the amount of differentiation between populations.

Allozymes are alternative forms of an enzyme that have the same function, are produced by different alleles, and are often detected by protein electrophoresis.

Anadromous refers to a life-history in which growth and maturity occur in saltwater, but spawning and some juvenile rearing occur in freshwater.

Anadromy (adj. Anadromous) is the life-history pattern that features early juvenile development in fresh water, migration to seawater, and a return to fresh water for spawning.

Anthropogenic means caused by humans.

Approach velocity is the calculated velocity component perpendicular to the fish-screen face.

Bank Storage Water stored in a streambank, usually infiltrating during a high flow.

Bank Full Discharge The discharge corresponding to the elevation of the top of stream channel just before it begins to flood**.**

Bar a mound of alluvium (sand or larger substrate materials) that forms in the stream channel.

Best Management Practice (BMP) Term used for management practices or prescription designed to protect the environment.

Artificial propagation of salmon refers to the practice of manually spawning adult fish and rearing the progeny in hatcheries, egg boxes, remote site incubators, or other facilities before release into the natural environment.

Biological Opinion is a document that includes: (1) the opinion of NOAA Fisheries as to whether or not a federal action is likely to jeopardize the continued existence of listed species or result in the destruction or adverse modification of designated critical habitat; (2) a summary of the information on which the opinion is based; and (3) a detailed discussion of the effects of the action on listed species or designated critical habitat. [50 CFR §402.02, 50 CFR §402.14(h)]

Bottleneck is a sharp reduction of a breeding population's size to a few individuals. It may have genetic consequences for the population.

Buildout refers to water supply and demand conditions at full implementation of the supply and transmission facilities authorized in the WSTSP.

Channel Pattern the configuration or plan view of the stream as seen from above.

Constructed Flood Channels stream channel that have been modified or new constructed channel to carry water during flood conditions**.**

Composite Population refers to the population that is comprised of both the hatchery-reared and naturally spawned population components.

Conservation is the use of artificial propagation to conserve genetic resources of a fish population at extremely low population abundance, and potential for extinction, using methods such as captive propagation and cryopreservation.

Cover anything that provides protection from predators or shelter from velocity, temperature or other adverse conditions**.**

Critical Habitat for listed species consists of: (1) the specific areas within the geographical area occupied by the species, at the time it is listed in accordance with the provisions of section 4 of the ESA, on which are found those physical or biological features (constituent elements) (a) essential to the conservation of the species and (b) which may require special management considerations or protection; and (2) specific areas outside the geographical area occupied by the species at the time it is listed in accordance with the provisions of section 4 of the ESA, upon a determination by the Secretary of the U.S. Dept. of the Interior that such areas are essential for the conservation of the species. [ESA §3 (5)(A)]

D_{50} is the median size of gravel as measured by the diameter of a particle – the diameter of 50 percent of particles.

Dendogram is a graphic representation of genetic-relatedness between populations, generally in the form of a tree with branches.

Deposition the accumulation of material onto the streambed.

Diploid refers to a genome when it contains two copies of each of its chromosomes. Microsatellite DNA is diploid, MtDNA is not (see haploid).

Diversion removal of surface water from a stream channel or lake

DNA (deoxyribonucleic acid) is a complex molecule that carries an organism's heritable information. The two types of DNA commonly used to examine genetic variation are mitochondrial DNA (mtDNA), a circular molecule that is maternally inherited, and nuclear DNA, which is organized into a set of chromosomes).

Domestication can occur when artificial selection in a hatchery environment produces fish with adaptations to the hatchery environment, but may result in loss of adaptations to the natural environment.

Effective Population Size is a mathematical construct that estimates the number of effectively breeding individuals in a population. It takes into account skewed sex ratios and variance in progeny number, as well as the actual number of breeders in a population.

Effective screen area is calculated by subtracting fish-screen area occluded by structural members from the total screen area.

Effects of the action are the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action. These effects are considered, along with the environmental baseline and the predicted cumulative effects, to determine the overall effects to the species for purposes of preparing a biological opinion on the proposed action. [50 CFR §402.02] The environmental baseline covers past and present effects of all federal actions within the action area. This includes the effects of existing federal projects that have not yet come in for their Section 7 consultation.

Electrophoresis is the movement of charged particles in an electric field. This process is an analytical tool used to detect genetic variation revealed by charge differences on proteins or molecular weight in DNA. Data obtained by electrophoresis can provide insight into levels of genetic variability within populations and the extent of genetic differentiation between them.

Embeddness the degree larger particles of sediment (gravel, cobble, or boulders) are surrounded and/or covered by smaller particles of sediment.

Endangered species is a species in danger of extinction throughout all or a significant portion of its range.

Environmental baseline is the past and present impacts of all federal, state, or private actions and other human activities in an action area, the anticipated impacts of all proposed federal projects in an action area that have already undergone formal or early Section 7 consultation, and the impact of state or private actions that are contemporaneous with the consultation process. [50 CFR §402.02]

Epistasis is the breakdown of coadapted gene complexes.

Escapement is the number of adult fish that "escape" fishing gear to migrate upstream to spawn.

Eutrophic is a water body characterized by high nutrient levels and phytoplankton productivity, and low water clarity. For example, Clear Lake.

Evolutionarily Significant Unit (ESU) is the NOAA Fisheries definition of a distinct population segment (the smallest biological unit that will be considered to be a species under the Endangered Species Act): A population will be/is considered to be an ESU if 1) it is substantially reproductively isolated from other nonspecific population units, and 2) it represents an important component in the evolutionary legacy of the species.

F Statistics: (e.g., $\mathbf{F_{ST}}$ $\mathbf{F_{IS}}$) (Wright 1931, 1943) measure the average genetic correlations within and between populations. An F_{ST}=1.0 between two populations indicates very divergent populations; F_{IS} is a measure of the genetic variance within a population.

$\mathbf{F_X}$ refers to generations removed from the parental generation. F_1 refers to the progeny of a given parental cross, F_2 refers to the offspring of those progeny. For example, F_1 refers to children and F_2 refers to grandchildren.

Fingerling a large fry usually the length of a human index finger.

Fitness is the capacity of an individual to leave fertile offspring to the next generation. It is the relative probability of survival and reproduction for a genotype.

Fluvial pertains to rivers and river action.

Fork length a measurement length for a fish from the tip of snout to the fork of the tail

Formal consultation is a process between NOAA Fisheries and a federal agency or applicant that: (1) determines whether a proposed federal action is likely to jeopardize the continued existence of listed species or destroy or adversely modify designated critical habitat; (2) begins with a federal agency's written request and submittal of a complete initiation package; and (3) concludes with the issuance of a biological opinion and incidental take statement by NOAA Fisheries. If a proposed federal action may affect a listed species or designated critical habitat, formal consultation is required (except when NOAA Fisheries concur, in writing, that a proposed action "is not likely to adversely affect" listed species or designated critical habitat). [50 CFR §402.02. 50 CFR § 402.14]

Freshet is a sudden rise in the water level of a stream or flooding caused by heavy rains or snow melt.

Fry refers to the stage in the salmonid life-history when the juvenile has absorbed its yolk sac and leaves the gravel of the redd to swim up into the water column.

Gamete a reproductive cell that is haploid, refers to both eggs and sperm.

Genes are the functional units of heredity, each being comprised of two alleles.

Genetic distance is a quantitative measure of genetic differences between a pair of samples.

Genetic drift is a stochastic process of genetic change through random changes in allele frequencies. These random changes can lead to loss or fixation of alleles in a population, and the magnitude of the effect is influenced by population size.

Genotype is the specific allelic composition of a cell, commonly for a gene or set of genes.

Habitat complexity refer to structurally complex habitat which can include large and small substrates, abundant cover objects or a diversity of water velocities and depth in close proximately.

Haploid is a genome when it contains one (not two) copies of each of its chromosomes. MtDNA is haploid.

Haplotype is the specific allelic composition of a haploid cell.

Hardy-Weinburg equilibrium is a specific, stable frequency distribution of genotypes in a population that results from random mating without mutation, migration, natural selection, or random drift.

Harvest Bycatch is capture of non-target species in a harvest activity. For example, a harvest effort directed at hatchery steelhead may result in bycatch of Chinook or coho salmon, or even of wild steelhead.

Hatchery Fish is a fish that has spent some part of its life-cycle in an artificial environment and whose parents were spawned in an artificial environment.

Heterozygosity is a measure of allelic diversity at a locus (or averaged over several loci) whereby alternate alleles at a locus are different.

Heterozygous is the condition of having two different alleles at a given locus of a chromosome pair.

Hypoliminion is the bottom portion of the reservoir below the thermoclyne where water is cooler.

Incidental take harm, injury or harassment of a species or its habitat listed under the endangered species act that occurs as the result of a lawful activity**.**

Infinite Allele Model of Kimura and Crow (1964) is a DNA mutation model that assumes each mutation creates a new allele with a low mutation rate. Unlike the stepwise mutation model, it assumes the mutation process erases any memory of previous alleles. Nei's D and Cavalli-Sforza and Edwards Chord Distance are genetic distances based on an infinite allele model.

Integrated Harvest Program is a project in which artificially propagated fish produced primarily for harvest are intended to spawn in the wild and are fully reproductively integrated with a particular natural population.

Integrated Recovery Program is an artificial propagation project primarily designed to aid in the recovery, conservation, or reintroduction of particular natural population(s), and fish produced are intended to spawn in the wild or be genetically integrated with the targeted natural population(s). It is sometimes referred to as "supplementation."

Isolated Harvest Program is a project in which artificially propagated fish produced primarily for harvest are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Isolated Recovery Program is an artificial propagation project primarily designed to aid in the recovery, conservation, or reintroduction of particular natural population(s), but the fish produced are not intended to spawn in the wild or be genetically integrated with any specific natural population.

Life-history stage refers to the developmental stage of the fish (e.g., egg, alevin, smolt, or adult).

Linkage is the association of genes on the same chromosome.

Listed Species is any species of fish, wildlife, or plant that has been determined to be endangered or threatened under section 4 of the ESA. [50 CFR §402.02]

Locus/loci is/are the site of a gene on a chromosome, often used interchangeably with gene.

Mesotrophic is a water body characterized by moderate nutrient levels, phytoplankton productivity, and moderate water clarity. May support algal blooms.

Microsatellite DNA is a form of variable-number tandem repeats (VNTRs) composed of short tandem repeat segments of two-to-five base pairs per repeat unit (e.g., $GTGTGT(GT)_n$). Microsatellite DNA is frequently used in studies of parentage and for distinguishing closely related populations. They have some of the highest mutation rates of any molecular tools used to date, are generally considered to be selectively neutral, are thought to be inherited in a Mendelian fashion, and are easily amplified with PCR.

Mitigation is the use of artificial propagation to produce fish to replace or compensate for loss of fish or fish-production capacity resulting from the permanent blockage or alteration of habitat by human activities.

Monophyly is evolutionary development from a single ancestral form.

MtDNA (mitochondrial DNA) is a small, haploid molecule, maternally inherited, that is useful for phylogenetic reconstruction. Mitochondria are organelles in the cell that have their own DNA.

Natural Channels Stream channels that have not been modified to carry flood waters**.**

Natural Fish is a fish that has spent essentially all of its life-cycle in the wild and whose parents spawned in the wild.

Natural Population is a population that is sustained by natural spawning and rearing in the natural habitat.

NATURES (Natural Rearing Enhancement System) was developed to produce "wild-like" fish from hatcheries with increased post-release survival.

Nonanadromous describes fish that live in fresh water and do not migrate to saltwater.

Non-native fish are fish species that have been placed in a habitat by man, not occurring naturally in the region.

Non-Target Population refers to populations that are not directly supported by an artificial propagation activity, but that are affected indirectly by artificial propagation activities intended to benefit another population.

Oligotrophic is a water body characterized by very low nutrient levels and high water clarity. Do not support algal blooms. For example, Lake Tahoe.

Panmmictic Population is the result of random mating within a population.

Phenotype is the physical form taken by a genetic character, or group of characters, in an individual. It is the expression of genetic information (genotype).

Phylogeny is the evolution of genetically related organisms.

PIT tag (**passive integrated transponder** tag) is an injectable, internal, radiotype tag that allows unique identification of a marked fish passing within a few inches of a monitoring site.

Polymorphic means having many forms.

Pool is a deeper area of the stream with slower velocities. The surface is usually flat with no apparent gradient**.**

Population Component refers to the naturally spawned or hatchery-reared individuals inhabiting the same river system.

Recovery means improvement in the status of listed species to the point at which listing is no longer appropriate under the criteria set out in section 4(a)(1) of the ESA. [50 CFR §402.02]

Redd(s) is the nest (or series of nests) that female salmonids dig in the streambed in which to deposit their eggs.

Resident fish are fish that spend their entire lives and complete their life history in fresh water**.**

Restriction Fragment Length Polymorphism (RFLP) analysis utilizes restriction enzymes to cut DNA strands that have nucleotide sequences specific to each enzyme. RFLP analysis can be used to detect both length variation and base substitution polymorphisms, and to detect DNA variation between individuals and between populations.

Riffle is a natural grade control that accelerates the water column producing a variety of flow velocities (critical and supercritical) which oxygenate the stream. Some substrate is often partially exposed.

Run is a swiftly flowing reach of stream with little surface agitation. May appear to be flooded riffle, substrate is usually covered by water.

Salmonid means of, belonging to, or characteristic of the family *Salmonidae*, which includes the salmon, trout, char, and whitefish. Salmonids discussed in this document include two species of Pacific salmon (Chinook and coho), and one species of Pacific trout (steelhead/rainbow trout).

SAR stands for smolt-to-adult survival.

Screen mesh opening is the narrowest opening in the screen mesh.

Section 7 refers to the section of the ESA of 1973, as amended, outlining procedures for interagency cooperation to conserve federally listed species and designated critical habitats.

Smolt used as a verb means the physiological process that prepares a juvenile salmonid to survive the transition from fresh water to saltwater. Used as a noun, smolt refers to a juvenile anadromous fish that has smolted.

Species includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species of vertebrate fish or wildlife that interbreeds when mature. [ESA §3(16)]

Stock Transfer refers to the active collection of fish from one river for use in a supportive breeding program in another river. This includes the transfer of fish from one ESU to another.

Supportive Breeding refers to any artificial propagation activity aimed at increasing the abundance at any life-stage of a species.

Substrate the material composing the bed of the river or the bottom of an aquatic habitat like a lake or estuary**.**

Sweeping velocity is the flow-velocity component parallel to the fish-screen face with the pump turned off.

Target Population refers to the population intended to benefit from an artificial propagation activity.

Threatened species is a species not presently in danger of extinction but likely to become so in the foreseeable future.

Viable Population Threshold is an abundance level above which an independent Pacific salmonid population has a negligible risk of extinction due to threats from demographic variation (random or directional), local environmental variation, and genetic diversity changes (random or directional) over a 100-year time-frame.

YOY (young-of-the-year) refers to fish in its first year of life.

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